

AD-A168 199

DOD BIOMECHANICAL RESEARCH(U) NAVAL BIODYNAMICS LAB NEM  
ORLEANS LA R J BIERSENER ET AL. 01 MAY 86 NBDL-86R005

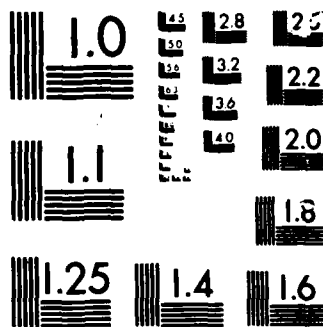
1/1

UNCLASSIFIED

F/G 6/19

NL





MICROCOPY

CHART

AD-A168 199

DOD BIOMECHANICAL RESEARCH

Robert J. Biersner and Henning E. von Gierke

Naval Biodynamics Laboratory  
Box 29407  
New Orleans, LA 70189-0407

and

Armstrong Aerospace Medical Research Laboratory  
Wright-Patterson Air Force Base, OH 45433-6573

1 May 1986

Letter Report



DTIC  
ELECTE  
JUN 2 1986  
S A D

Approved for public release; distribution is unlimited.


Prepared for

Naval Medical Research and Development Command  
Bethesda, MD 20014

00 6 2 029

ORIGINAL FILE COPY

Approved by  
  
CDR D. M. Herron, MSC, USN  
Executive Officer

Released by  
  
CAPT Robert J. Biersner, MSC, USN  
Commanding Officer

Naval Biodynamics Laboratory  
Box 29407  
New Orleans, LA 70189-0407

Approved for public release; distribution is unlimited. Reproduction in whole or part is permitted for any purpose of the United States Government.

The opinions and interpretations contained herein are those of the authors, and do not necessarily represent the views, policies, or endorsement of the Department of the Navy or any other government agency.

CLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

## REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release. Distribution is unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NBDL-86R005		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION Naval Biodynamics Laboratory	6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) P.O. Box 29407 New Orleans, LA 70189-0407		7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Naval Medical Research & Development Command	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code) Naval Medical Command National Capital Region Bethesda, MD 20814-3850		10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. N/A PROJECT NO. N/A TASK NO. N/A WORK UNIT ACCESSION NO. N/A	
11. TITLE (Include Security Classification) DOD Biomechanical Research (Unclassified)			
12. PERSONAL AUTHOR(S) Robert J. Biersner, CAPT, MSC, USN, Naval Biodynamics Laboratory & Henning E. von Gierke, Armstrong Aerospace Medical Research Laboratory			
13a. TYPE OF REPORT Letter	13b. TIME COVERED FROM N/A TO	14. DATE OF REPORT (Year, Month, Day) 1986 May 1	15. PAGE COUNT 11
16. SUPPLEMENTARY NOTATION None			
17. COSATI CODES FIELD GROUP SUB-GROUP 06 02 19		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Biodynamics; Biomechanical; Impact; Injury; Modeling; Trauma	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) The enclosed material includes documents written in rebuttal to an article published in Science by the Commanding Officer of this Laboratory and by the Director, Biodynamics and Bioengineering Division of the Armstrong Aerospace Medical Research Laboratory located at Wright-Patterson Air Force Base. A copy of this article is included as Appendix A. The letter forwarding this rebuttal to Science (i.e., Letter to the Editor) is provided as Appendix B. As indicated by Appendix C, this rebuttal was not published in Science because of a lack of available space, although a more general rebuttal was published earlier as a letter to the editor of Science (see Appendix D). The authors of this letter report believe that a more detailed response related specifically to the biomechanics programs sponsored by the Department of Defense is justified, and have therefore decided to make this information a matter of public record.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL ROBERT J. BIRSNER, CAPT, MSC, USN		22b. TELEPHONE (Include Area Code) (504) 255-4870	22c. OFFICE SYMBOL NBDL 00

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted.  
All other editions are obsolete.SECURITY CLASSIFICATION OF THIS PAGE  
UNCLASSIFIED

## SUMMARY

The enclosed material includes documents written in rebuttal to an article published in Science by the Commanding Officer of this Laboratory and by the Director, Biodynamics and Bioengineering Division of the Armstrong Aerospace Medical Research Laboratory located at Wright-Patterson Air Force Base. A copy of this article is included as Appendix A. The letter forwarding this rebuttal to Science (i.e., Letter to the Editor) is provided as Appendix B. As indicated by Appendix C, this rebuttal was not published in Science because of a lack of available space, although a more general rebuttal was published earlier as a letter to the editor of Science (see Appendix D). The authors of this letter report believe that a more detailed response related specifically to the biomechanics programs sponsored by the Department of Defense is justified, and have therefore decided to make this information a matter of public record.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Avail and/or	
Dist	Special
A-1	



## TABLE OF CONTENTS

Letter to the Editor.....	1
Transcript of <u>Science</u> .....	Appendix A
Article Entitled "Academy Prepares a Federal Trauma Center"	
Letter Forwarding Rebuttal.....	Appendix B
Letter Rejecting Rebuttal.....	Appendix C
Transcript of Earlier Rebuttal Letter Published in <u>Science</u> .....	Appendix D

## Letter to the Editor

In her article "Academy Proposes a Federal Trauma Center" (News and Comment, 7 June, p. 1180), Constance Holden in reviewing (1) stated: "Suprisingly, the committee did not find any trauma research worth mentioning going on in the Department of Defense." Despite A. Lazen's claim (Letters, 19 July) that the committee reviewed thoroughly DoD's contributions to trauma research, we believe that Ms. Holden's inappropriate and unfortunate choice of words originated from the shortcomings of the report in question. These shortcomings include a failure to analyze and discuss DoD capabilities in, and contributions to, trauma research; not mentioning DoD dollars spent in this area in their federal expenditure tables; and, glossing over these issues with sentences such as "DoD is the only agency that might currently have extensive programs in all the fields of research needed. However, its efforts concentrate on defense-related applications of injury research," [(1) p. 114; underlining by the writers]. It would appear that a Congressionally-authorized study by the National Academy of Sciences would go deeper in its analysis than to be content with statements such as this which omit important facts for some of the subareas studied. The data should have been easily available, particularly through two members of the committee, Robert R. McMeekin, Director of the Armed Forces Institute of Pathology, and Albert I. King, who has extensive knowledge of the biomechanics work being conducted at Air Force and Navy laboratories. However, the Air Force and Navy laboratories were not requested by the committee to provide this information.

The easily available fact is that the Armed Forces has been the focus for most experimental work on biomechanics, including injury mechanisms and biodynamics responses, since the early 1950's. Under Air Force and Navy sponsorship,



Colonel John Paul Stapp and other military volunteers willingly submitted to impact sled tests which explored the human capability to withstand crash forces. This work in part led to the development of principles and criteria of crash protection, which are credited with contributing to the prevention of thousands of deaths and serious injuries on our highways. As an acknowledgment to this work, the most important yearly technical conference in the area of biomechanics, sponsored by the Society of Automotive Engineers and attended by national and international researchers, is called the "Stapp Car Crash Conference." Since this early work, the science and technology of biomechanics have become increasingly sophisticated through DoD support to in-house, university and industry programs. Unique impact facilities for use in systematic research on volunteer human subjects are available only in DoD laboratories. Over the last several decades, the Air Force and Navy have provided several millions of dollars per year for research and development programs in biomechanics.

When, in the national interest, tests with live subjects of new crash protection devices were desired, DOT, FAA and NASA turned to Air Force and Navy laboratories for testing of these devices. The use of air bags for automotive safety, as well as the impact criteria for our space program, were evaluated in extensive tests with human volunteers at DoD facilities. To do such potentially hazardous tests safely and cost-effectively not only requires multimillion dollar facilities and support instrumentation, but dedicated researchers, extensive experience and long-range programs. It is primarily this continuous work which enabled researchers to develop mathematical models to define mechanisms and probabilities of injury, and to reduce, through application of this technology, the need for extensive use of animal subjects or human volunteers in crash protection programs. It is no coincidence that

national, as well as international, standards committees have arrived at established human test procedures, data collection and model prediction using the results of efforts supported primarily by DoD agencies. It has been only four years since, at the request of the U.S. Air Force, the National Academy of Sciences studied a related problem addressed in a report (2) entitled "The Feasibility of a National Biomechanics Data Bank." The recommendations of this report, which were aimed at the reduction of mortality and morbidity from biomechanical injury through standardized collection and assessment of injury statistics, protective systems effectiveness, laboratory biodynamic response data, and injury prediction models, are not mentioned in this new analysis. Only the National Highway Traffic Safety Administration accident surveillance system was discussed, not DoD's efforts in establishing and making available a broader-based biomechanics data bank.

Omission of DoD's research capabilities and facilities in biomechanics--not to mention its contributions to clinical injury and burn treatment for which we feel unqualified to speak--does not affect the main recommendations of the report "Injury in America," which we wholeheartedly support. However, full assessment of existing capabilities including those of DoD, might well lead to more expeditious and cost-effective solutions to the recommendation made in this report. Such an assessment would most certainly be in the national interest.

Henning E. von Gierke  
Director, Biodynamics & Bioengineering  
Division  
Armstrong Aerospace Medical Research  
Laboratory  
Wright-Patterson AFB, OH 45433-6573

Robert J. Biersner  
Captain, MSC, USN  
Commanding Officer  
Naval Biodynamics Laboratory  
New Orleans, LA 70189-0407

1. Committee on Trauma Research, National Research Council and Institute of Medicine. Injury in America (National Academy Press, Washington DC, 1985)
2. Committee on Hearing, Bioacoustics and Biomechanics, Assembly of Behavioral and Social Sciences, NRC. The Feasibility of a National Biomechanics Data Bank, National Academy Press, Washington DC, 1981.

## Academy Proposes a Federal Trauma Center \*

A committee of the National Research Council and the Institute of Medicine has settled upon the Centers for Disease Control (CDC) as the most appropriate location for a centralized federal agency for the study, treatment, and prevention of trauma.

Produced at the behest of the Department of Transportation (DOT), the group's report, "Injury in America, " declares injury to be the "principal public health problem in America today." Accidents, the fourth leading cause of death, kill more than 140,000 people a year, one-third of them on the roads. They leave 80,000 permanently disabled from brain or spinal cord injuries. Alcohol is involved in half of all highway accidents and is heavily implicated in shootings, falls, drownings, poisonings, and burns, as well as in 80 percent of suicides.

The committee, headed by former CDC director Williams Foege, notes that federal research funds--about \$112 million a year--are paltry in relation to the annual treatment costs of \$75 to \$100 billion. It calls for stepped-up research, particularly on biomechanics; safer product design; new "centers of excellence," a major extension of rehabilitation programs; and much more data-gathering. The report notes that federal efforts are now lamentably fragmented: most epidemiological and prevention research is done within the DOT; biomechanics is spread around the National Institutes of Health, and rehabilitation research is mostly conducted at the Veterans Administration. Surprisingly, the committee did not find any trauma research worth mentioning going on in the Department of Defense.

With regard to injury prevention, the report contends that "automatic protection" (such as collapsible steering wheels, or perhaps weaker liquor for

drinkers) is the best strategy. Education is not seen as the answer: "neither safety-education campaigns nor driver-education campaigns nor driver-education programs have been shown by scientific evaluation to justify the faith and large budgets accorded them." Legal remedies are better, says the report, but laws "tend to be least effective among the very groups that are at the highest risk of injury."

The committee decided the CDC was the best place for a Center for Injury Control because much of the work is too applied and too interdisciplinary for the National Institutes of Health. Besides, NIH doesn't want any more institutes. According to neurosurgeon Ayub K. Ommaya, a consultant to the DOT, the transportation subcommittee of the House Appropriations Committee, headed by William Helman (D-Fla.), is now working on legislation to facilitate the panel's recommendations. Initial funding is to be by the DOT; no budget has yet been determined.--Constance Holden

\* From C. Holden, Science, 1985, Vol. 228, pages 1180-1181. Copyright (1985) by the AAAS.



DEPARTMENT OF THE NAVY

NAVAL BIODYNAMICS LABORATORY

BOX 29407

NEW ORLEANS, LOUISIANA 70189-0407

IN REPLY REFER TO

5219

NBDL 00

13 August 1985

Daniel E. Koshland, Jr., Ph.D.  
Editor, Science  
AAAS  
1333 H. Street, NW  
Washington, D.C. 20005

Dear Doctor Koshland:

Please find enclosed an editorial comment which Dr. Henning E. von Gierke and I have written in response to an article published in your journal several months ago. We hope that you find this article appropriate for publication in Science.

Should you have any questions or comments regarding the enclosed statement, please contact me at (504) 255-4870 or Dr. von Gierke at (513) 255-3602.

Sincerely,

ROBERT J. BIRSNER  
Captain, Medical Service Corps  
United States Navy  
Commanding Officer

Encl:  
(1) Letter to the Editor

# SCIENCE

PUBLISHED BY THE AMERICAN ASSOCIATION  
FOR THE ADVANCEMENT OF SCIENCE  
1111 H STREET, N.W., WASHINGTON, D.C. 20005  
(202) 326-6500

CABLE ADDRESS: ADVANCESCI

28 October 1985

Capt. Robert J. Biersner  
5219. NBDL 00  
Naval Biodynamics Laboratory  
Box 29407  
New Orleans, LA 70189-0407

Dear Capt. Biersner:

Thank you for your letter of 13 August. A copy was sent to the author for her information and possible reply.

I regret to say that we are not able to publish it. We wish we could print more letters, but space restrictions limit us to a very small fraction of those we receive.

This decision relates only to your current letter and should not inhibit your writing on another topic in the future.

Yours sincerely,



Christine Gilbert  
Letters Editor

CG:jp

cont'd

rebutal Trauma Research \* maintains that:

Constance Holden states in her article "Academy proposes a federal trauma center" (~~News and Comment~~, 7 June, p. 1180) that "Surprisingly, the committee did not find any trauma research worth mentioning going on in the Department of Defense."

The committee that prepared the report did not review research on trauma by agency but rather by research area, for example, biomechanics or epidemiology. Nevertheless, we believe the important role played by the Department of Defense (DOD) was recognized. The report, Injury in America: A Continuing Public Health Problem, lists DOD along with the Department of Transportation and the National Institutes of Health as agencies that now perform research on injury (on page 17), uses references to work performed in DOD, and in discussing which federal agencies should be considered for an injury control center says, "DOD is the only agency that might currently have extensive programs in all the fields of research needed." An additional indication of the recognition of DOD research in this area is the fact that Colonel Robert R. McMeekin, director of the Armed Forces Institute of Pathology, served as a member of the committee.

\* From A. G. Lazen, Science, 1985, Vol. 229, page 227. Copyright (1985) by the AAAS.



END  
DTIC

7-86